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**ABSTRACT**

A method of encoding a plurality of pre-defined codes into a search key and a method of using the search key to locate a longest matching pre-defined code to a given code is disclosed. Encoding the pre-defined codes into a search key involves producing a prefix node bit array (PNBA) having a plurality of bit positions corresponding to possible bit combinations of a bit string having a length producing a Prefix Node Bit Array (PNBA) having a plurality of bit positions corresponding to possible bit combinations of a bit string having a length equal to or less than the longest predefined code in said plurality of said pre-defined codes such that said bit positions are arranged by the lengths of said possible bit combinations and by numeric value of said possible bit combinations and to setting bits active in bit positions which correspond to bit combinations of said possible bit combinations identified by said pre-defined codes. The method of locating involves producing a search mask encoding at least one portion of said given code and comparing said search mask to a search key having a Prefix Node Bit Array (PNBA) in which a bit is set active in at least one of a plurality of bit positions corresponding to possible bit combinations of bits in a bit string having a length equal to or less than the longest predefined code in said plurality of said pre-defined codes and arranged by the lengths of said possible bit combinations and by numeric values of said bit combinations, to identify a common active bit position in said search key and said search mask corresponding to a one of said pre-defined codes having a length greater than all others of said pre-defined codes which correspond to common active bit positions.

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